REMARKS

The subject invention relates to devices for performing optical inspections on semiconductor wafers. As semiconductor fabrication has become more complex, the need for highly accurate measurements during the fabrication process becomes more important. Optical metrology tools that satisfy this need often include the capability to perform spectroscopic measurements over a broad wavelength range. In the early instrumentation, such measurements were often made over the visible light spectrum, from about 400 to 800nm in wavelength. A typical light source which generates light at these wavelengths is a tungsten lamp. More recently, the metrology tools have been enhanced to include the capability of measuring in the UV band. In order to get enough UV light to make useable measurements, an additional light source, typically a deuterium lamp, was used. This arrangement is illustrated in Figure 1B of the subject application.

The use of both a tungsten and a deuterium lamp produced a broadband probe beam having wavelengths extending over both the visible and UV ranges. However, it was found that the intensity over this wavelength range was not uniform. In accordance with the subject invention, this deficiency was addressed by adding a third light source, with the wavelength of that third source being selected to compensate for the non-uniformity in the output intensity of the two lamps. In one preferred embodiment, the third light source is an LED, emitting light in a relatively narrowband region within the blue visible spectrum.

In the Office Action, the Examiner rejected various claims as being either anticipated or rendered obvious by Zarling (5,736,410) or Miller (2002/0007080). In response to the Office Action, applicants have cancelled claims 1-22 and have amended claim 23 to more particularly define the subject invention. New independent claim 29 has also been added to cover the above discussed concept in a somewhat different form.

The Zarling reference relates to a device for inspecting biological samples. The light source used by Zarling consists of a plurality of laser diodes, each operating at a different wavelength. The wavelengths are chosen to correspond to certain excitation frequencies of the target markers. Zarling does not disclose the use of broadband lamps. Zarling does not disclose the use of UV wavelengths. Zarling does not disclose the concept of using a narrowband light source to supplement the output from two broadband sources to make the total output intensity

more uniform. Accordingly, Zarling cannot anticipate or render obvious the pending independent claims.

The patent to Miller relates to a system for generating two dimensional spectral images of an object. The light source of Miller also includes a plurality of LED's covering a wide wavelength range. One important aspect of the Miller design is the capability of controlling the illuminator "to provide monochromatic light in one wavelength band after another." (see, paragraph 0019). In order to insure that a plurality of distinct narrowband outputs can be generated, the LED output can be directed through passband filters (see, paragraph 0031). As with Zarling, Miller does not disclose the use of broadband lamps. Miller does not disclose the use of UV wavelengths. Miller does not disclose the concept of using a narrowband light source to supplement the output from two broadband sources to make the total output intensity more uniform.

In the Office Action, the Examiner cited to paragraph 0046 of Miller where he mentions that other light sources, such as lamps, could be used. The mere mention of a "lamp source" however, is not a teaching of using a broadband visible lamp or a broadband UV lamp. More importantly, in the context of Miller, the use of a broadband lamp does not make much sense. As noted above, one important aspect of Miller is to be able to independently generate a series of narrowband (monochromatic) outputs. Normal broadband light sources would not provide such a capability. It should also be noted that all lamps are not broadband lamps. In fact, lamps do exist which generate narrowband light (e.g. a mercury arc lamp) and might be useable in the Miller device.

In the Office Action, the Examiner took Official Notice of the fact that deuterium lamps, tungsten lamps and LED's are well known light sources. Applicants do not disagree. However, applicants invention, as currently claimed, is not taught or suggested by the prior art, even in light of Official Notice taken by the Examiner. More specifically, even though such light sources are known, the Examiner must still demonstrate that some suggestion exists in the prior art that such lamps could be used as substitutes for the laser diode sources of Zarling or Miller **and** that the results of the substitution would correspond to applicants claimed combination. Neither is true.

The Zarling system only discloses the use of laser diodes selected to excite certain targets and there would be no motivation to switch to broadband lamps. As noted above, in the Miller

system, an important aspect is to provide intensity control for a series of monochromic measurements. On skilled in the art would not be motivated to use broadband light sources since Miller's goal would be much harder, if not impossible, to achieve. Finally, even if it were obvious to substitute broadband lamps for the laser diodes of either Zarling or Miller, this combination would still not meet the limitations of the current claims which include a broadband visible lamp, a broadband UV lamp and a narrowband light source having a wavelength selected to compensate for the output deficiencies of the two broadband lamps.

Based on the above, it is respectfully submitted that amended independent claim 23 and new independent claim 29 define patentable subject matter and allowance thereof, along with the claims depending therefrom, is respectfully solicited.

Respectfully submitted,

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